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Simulation and Comparison reactive and proactive routing protocol in wireless network with ns-2

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ABSTRACT: A Ad-hoc NETWORK is a kind of wireless network and is a self-configuring, network of mobile routers connected with wireless links. In this paper, some main routing protocols used in Ad Hoc network, such as, AODV and DSDV and DSR are analyzed in the Network simulator. Performances of these four routing protocols are simulated in network simulator. Different routing protocols, which may be categorized in to two major classes, proactive and reactive.

***Keywords*:** Ad-hoc Network, DSR, AODV, Routing Protocols.

INTRODUCTION

Recently, the usage of mobile devices in several applications has increased. A major reason with this increase has been the progress made in wireless networks research. Mobile ad hoc networks (MANETs) [2] are a significant class of wireless networks which allows their nodes to maneuver freely. Nodes in a MANET can exchange data directly if they're within exactly the same radio range, and when they are far apart they exchange data through other nodes. Thus, a node in a MANET acts both as a communication end and a router. Because MANETs have limited radio communication bandwidth and use battery power, their protocols, such as the routing protocols, should be efficient in the use of bandwidth and energy. An important method to conserve bandwidth and energy is reducing control overhead. You will find two classes of ad hoc routing protocols, the proactive and the on-demand protocols [3]. In the proactive routing protocols, a node typically maintains an area routing table that's an access for every destination in the network. Examples of proactive routing protocols are Destination-Sequenced Distance-Vector Routing protocol (DSDV).

Three Kinds of Route Algorithm in Ad Hoc

AODV (Distance Vector Routing)

AODV is a better version of DSDV [1]. As a matter of fact, the primary difference between them is based on reactive route protocol. To be able to find path to destination, the source node will broadcast a request. Moreover, adjacent nodes will broadcast that packet until it reaches a node which provides the path information about destination node. When the node forward packets, it enter ID in its table such that it constructs route from destination node to source node. If the foundation node moves, it will begin route discovery again. If the intermediate node moves, the link is likely to be invalid and the node will send this message to source nodes. Then, the source node begins route discovery again.

AODV utilizes periodic beaconing (HELLO packets) for route maintenance. In case anode doesn't receive a HELLO packet in just a certain time, or it receives a route break signal that's reported by the link layer, it sends a route error packet by either unicast or broadcast, with respect to the precursor lists (i.e. active nodes towards the destination), in its routing table. AODV avoids the stale route cache problem of DSR and it adapts the network topology changes quickly by resuming route discovery from the beginning.

DSDV (Destination - Sequenced Distance-Vector Routing)

DSDV [4] is definitely an enhancement to distance vector routing for ad-hoc networks. A sequence number can be used to tag each route. A route with higher sequence number is more favorable when compared to a route with lower sequence number. However, if two routes have exactly the same sequence number, the route with fewer hops is more favorable. In case there is route failure, its hop number is defined to infinity and its sequence number is risen to an unusual number where even numbers are reserved and then connected paths. 3

The detailed implementation of DSDV [1] by NS-2 is a packet will be cached if it doesn't find route Information. At the same time, the node send checking information continuously until it find reacting message from the receiver. When cache is overflowed, the latest packets will be abandoned.

DSR (Dynamic Source Routing)

DSR such as two parts, [5] route maintenance and route discovery. It is dependent on source routing meaning the node send a data packet lists in its header the nodes that the packet shall go through. A short discussion for route maintenance and route discovery is given in the next subsection.

Discovery

When an initiating node really wants to send a data packet to a target node, In its route cache for a path to the goal node, in case a route is available it's used to send the packet. Just In case no route is within the route cache the initiator node broadcast a route request with a distinctive identifier regarding to the route requests recently sent before using this node to the nodes in their primary radio transmission selection in the ad hoc network. In the event a receiving node observed a route demand from the initiator with the exact same identifier before, it discards the route demand, otherwise, when it is the goal of the route request, it send a route reply with the passed nodes, otherwise, it looks for a approach to the goal of the route request in its route cache and sends a route answer with the route if discovered, or even found, it appends its address to the passed nodes in the route demand and again broadcasts the path demand to the bordering nodes in their direct indication range.

Maintenance

Route maintenance in DSR [1] is the method of ensuring a delivered data packet has achieved reached the destination and you can find no damaged hops through the path because two nodes turned past an acceptable limit, for example. To use this method, each node getting a data packet through the entire the route shown in the packet's header directs an acknowledgment to its previous node. Just in case, no acknowledgment is received following a fixed quantity of re-transmission of a data packet this hop is recognized as damaged and a route error is delivered to the sending node utilizing the same route employed by the packet to achieve the present node. Then, the initiator eliminates the damaged hop from the demands in its route cache and initiates a route demand to the goal if needed. Many optimizations have been designed to DSR [4].

Simulate and Result

For the simulation of the developed system, latest version 2.26 of NS-2 has been utilized in this paper. Ns-2 is just a discrete event simulator geared towards networking research.

Scenarios

Performance Metrics

The following different performance metrics are evaluated to understand the
Behavior of DSDV, AODV and DSR routing protocols.

- Throughput
- The average end to end delay.
- Packet delivery.

Table 1. simulation parameters

Parameter	Value
Simulator	Ns-2
Channel type	Channel/Wireless channel
Radio-propagation	Propagation/Two ray round wave
MAC Type	Mac /802.11
Inter queue Type	Queue/Drop Tail
antenna	Antenna/Omni Antenna
Maximum packet in ifq	50
Area (M*M)	500*500
Maximum speed	10 m/s
Number of mobile node	50
Source Type	UDP
Pause time	20,40,60,80,100s
Simulation Time	500s
Routing protocol	AODV,DSDV,DSR

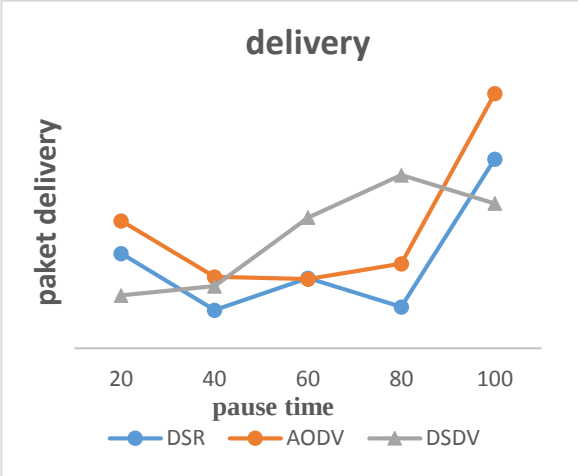


Figure 1. packet delivery vs pause times

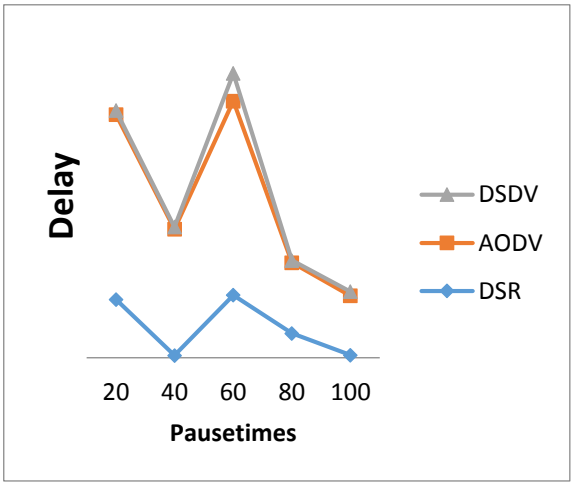


Figure 2. Average Delay vs pause times

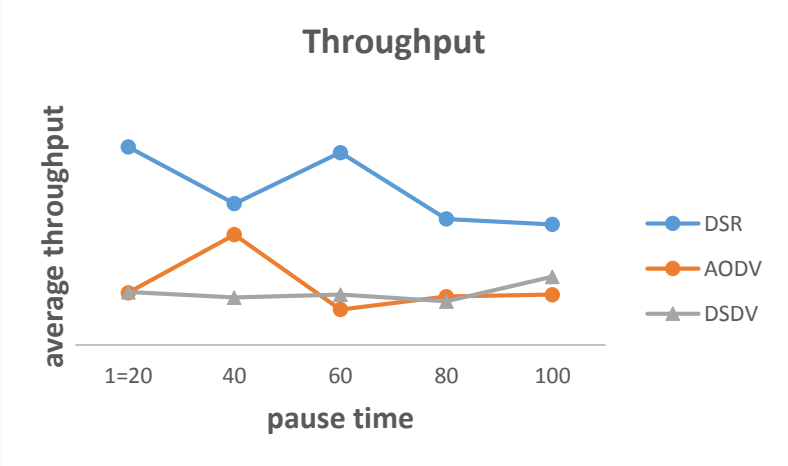


Figure 3. Average Throughput vs pause times

Simulation 2

In this simulation pause time is varying and considered **2**0, **4**0, **60**, **80**, and **1**00 second. The network parameters we have used in this simulation shown in the table2.

Table 2. simulation parameters

Parameter	Value
Simulator	Ns-2
Channel type	Channel/Wireless channel
Radio-propagation	Propagation/Two ray round wave
MAC Type	Mac /802.11
Inter queue Type	Queue/Drop Tail
antenna	Antenna/Omni Antenna
Maximum packet in ifq	50
Area (M*M)	500*500
Maximum speed	10 m/s
Number of mobile node	70
Source Type	UDP
Pause time	20,40,60,80,100s
Simulation Time	500s
Routing protocol	AODV,DSDV,DSR

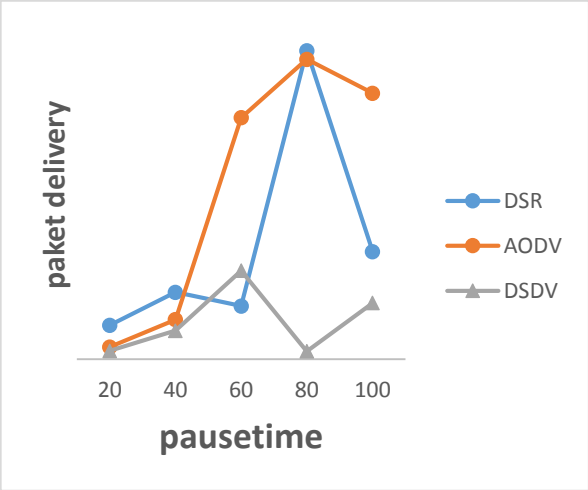


Figure 4. Packet delivery vs pause times

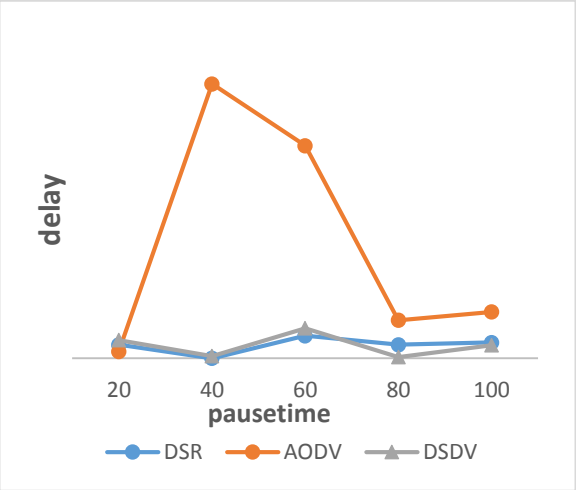


Figure 5. Average Delay vs pause times

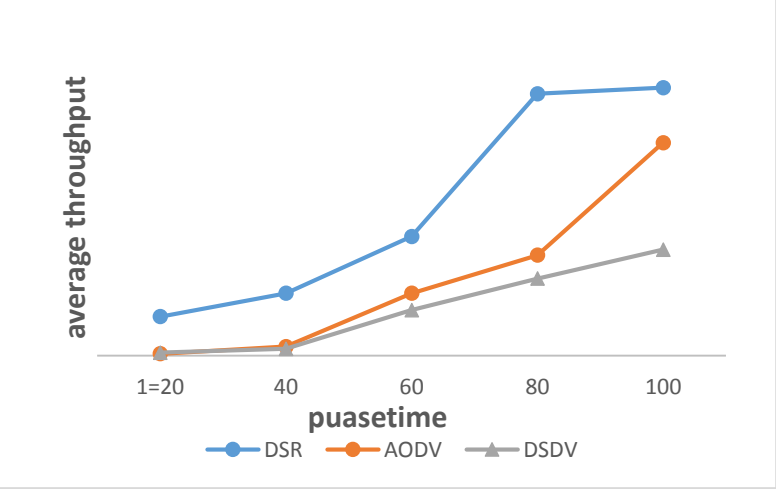


Figure 3. Average Throughput vs pause times

Conclusion

With the help of NS network simulator, we contrasted and compared the routing algorithm in four Ad hoc networks which are based on the 802.11 MAC protocol. We designed two simple experiments to analyze those four routing protocols. We mainly focused on the effects on the throughput, delay and the packet delivery on MAC layer which are caused by the number of nodes and the pause times, and we obtained a conclusion in the end.

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